JET PROPULSION LABORATORY INTEROFFICE MEMORANDUM

SL:LMIT-002-001
March 20, 2002

TO: G. Burke

FROM: S. Lineaweaver

SUBJECT: Geostationary Operational Environmental Satellite N-Q Launch Opportunity Evaluation

As requested, the Resource Analysis Team evaluated the Geostationary Operational Environmental Satellite N-Q (GOES N-Q) request for Deep Space Network (DSN) support. The evaluation focuses on the support GOES N-Q should expect to receive if launch occurs on either of two proposed dates during the "Mars Crunch" in 2003 and 2004 and the effect GOES requirements have on other project support and Deep Space Network (DSN) resources.

Analysis was accomplished using the Forecasting and Scheduling Tool for Earth-based Resources (FASTER) forecasting system and the mission set database from the February 2002 Resource Allocation Review Board (RARB). The analysis assumes launch will occur on the first day of each launch period.

The GOES N-Q Project provided enough information to generate two viewperiod files, one for each launch opportunity, including view periods for the first 17 days following each launch.

Requirements

Launch Opportunities during "Mars Crunch" 2003-2004

November 20, 2003		
Launch	Nov 20-21 2003	Continuous at visible periods
Launch and Orbit Raising	Nov 22-Dec 09 2003	About 16 h/day
Bus In Orbit Test	Dec 10-13 2003	DSS-16, full view
January 4, 2004		
Launch	Jan 07-08 2004	Continuous at visible periods
Launch and Orbit Raising	Jan 09-26 2004	About 16 h/day
Bus In Orbit Test	Jan 27-30 2004	DSS-16, full view

The attachment profiles the support requested in passes per week on 26-meter DSN stations with visibility of the spacecraft and pass duration as defined by view periods at each DSN station.

Initial Assessment

Figures 1 and 2 show the forecast weekly supportable hours of GOES N-Q launch and orbit raising requirements for the first 17 days of each launch period studied.

Figure 1. GOES N-Q November 20, 2003 Launch Opportunity

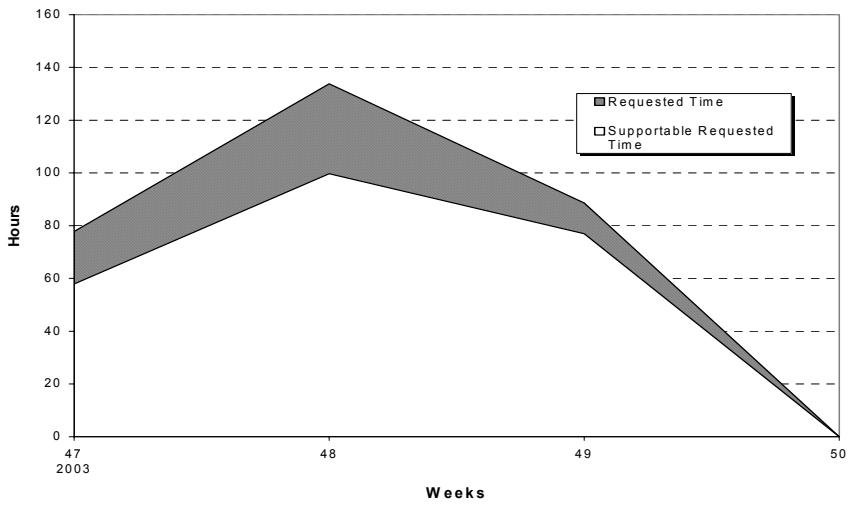
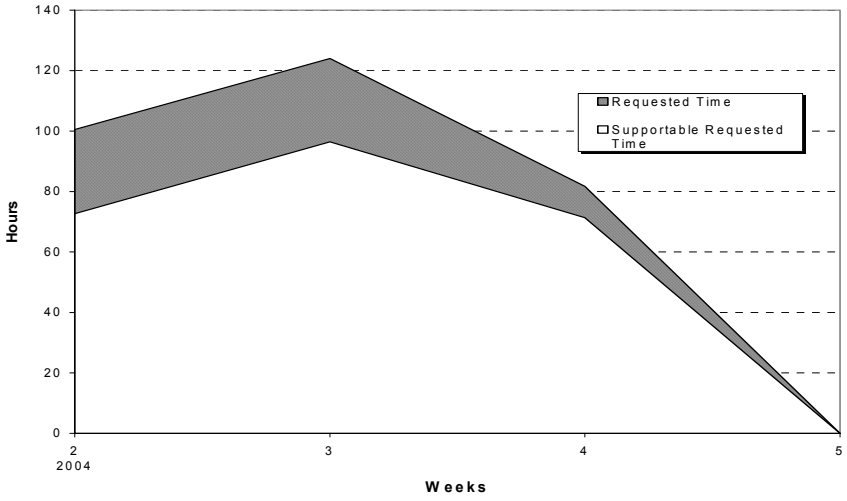
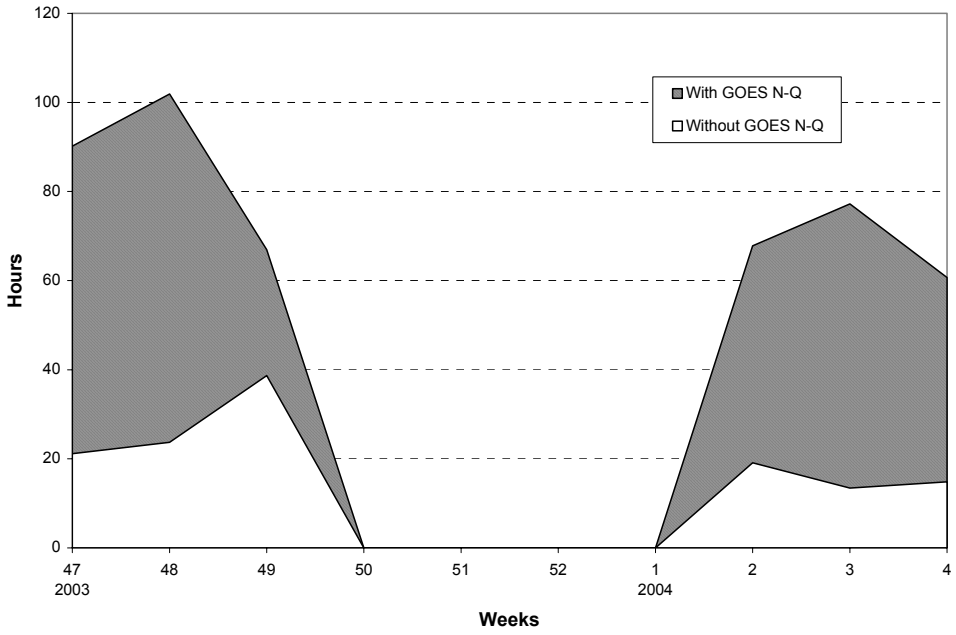


Figure 2. GOES N-Q January 7, 2004 Launch Opportunity



GOES N-Q should expect to receive an average of 73 percent of the requested time in the first week of each launch period and between 75 and 85 percent in the weeks following. The addition of GOES N-Q requirements during both periods studied causes a marked increase in 26-meter user unsupportable time, as shown in Figure 3.

Figure 3. Subnet Unsupportable Time
With and Without GOES N-Q Requirements



Detailed Assessment

Launch November 20, 2003

During the first two days of GOES N-Q LOR operations, continuous 26-meter support is requested from DSN stations with visibility of the spacecraft and about 16 hours per day are requested for the remainder of the LOR phase. SOHO is performing the 9th and final week of HSO operations through the end of week 47. The HSO observation requires continuous DSN coverage. The HSO observation time, normally 13 weeks in duration, was reduced to 9 weeks at the February 2002 RARB to assure support for other 26 meter users during increased activity on the 70- and 34-meter subnets. On the first two days of GOES N-Q launch support SOHO and GOES N-Q are in contention for 100% of the time needed by each mission at DSS-46 and 66. GOES N-Q also has contention with INTEGRAL on the day of launch at DSS-16.

In week 48 and 49 SOHO requires 13 hours per day for nominal tracking, maintenance is performed routinely for one 6 to 8-hour period each week at each antenna, and INTEGRAL requires a daily 5.3-hour pass at DSS-16. Polar requires 6 hours per day in 1 and 2 hour intervals. On the three maintenance days each week SOHO and GOES unsupportable time is greater than 50% with the remaining days slightly less.

From L+15 days Goldstone is the only 26-meter station with visibility of the GOES N-Q spacecraft. GOES N-Q is in contention with INTEGRAL for time at DSS-16 on 2 of the 3 days studied.

The GOES N-Q viewperiod overlaps the Sun viewperiod for much of the period causing contention for DSN resources with SOHO and frequent to periodic contention with ACE, DSS Maintenance, INTEGRAL, and Polar missions. Weekly unsupportable time for these users increases from below 14% to between 17-47% as a result of adding GOES N-Q LOR requirements to the mission set.

Launch January 7, 2004

During the first two days of GOES N-Q LOR operations continuous 26-meter support from DSN stations with visibility of the spacecraft is requested. The remaining 16 days the LOR phase requires about 16 hours per day. SOHO and DSS Maintenance requirements are currently planned at 50% of nominal support requests. The reductions are due to high activity on the 70- and 34-meter subnets and previous RARB negotiations to provide time on the 26-meter subnet for users offloading support from 34-meter antennas in the first 4 weeks of 2004. Negotiated support for SOHO includes three 6-hour passes per week and two 1.6-hour passes daily, replacing the nominal 13 hour per day request. DSS Maintenance support is reduced to one 4-hour period at each antenna each week. Some ACE and Chandra support, one 3.5-hour pass and fourteen 2-hour passes respectively, were moved from 34-meter antennas to the 26-meter subnet as a result of RARB negotiations to relieve contention on the 34-meter subnet. Some Polar support was offloaded to the 34HSB antenna at the February RARB but 3 to 4 hours per day in 1 and 2-hour intervals on 26-meter antennas are requested. INTEGRAL requires one 5.3-hour pass at DSS-16 daily.

The requirements for the January 7, 2004 launch causes similar increases in 26-meter user unsupportable time to that of the 2003 opportunity (refer to Figure 3). GOES N-Q has contention with ACE, Chandra, DSS Maintenance, INTEGRAL, Polar, and SOHO for the period studied. Weekly unsupportable time for these users increases from below 12% to between 15-34% as a result of adding GOES N-Q LOR requirements to the plan.

Summary

This support evaluation reviewed the Geostationary Operational Environmental Satellite N-Q requirements during two proposed launch opportunities. The first two days of GOES N-Q LOR requirements are forecast slightly above 70% supportable in both cases and between 75 and 85% supportable for the remainder of the phase. Contention with other users of DSN 26-meter resources is high. Particular concern is noted during the January opportunity where some users have previously reduced support to near health and safety levels and where actions to resolve contention on the 34 and 70-meter antennas remain uncertain.

The results of adding GOES N-Q requirements into the “Mars Crunch” period strongly suggest a recommendation to move the launch to another time. It is estimated that a move beyond 2004 Week 13 would be marginally better. Analysis presented at the February 2002 RARB identified that contention on DSN resources from August through December 2004 is low. Moving the GOES N-Q launch inside this period would assure above 90% supportability.

As always, the results of this evaluation are preliminary in that the network load changes as requirements for planned missions are input and updated.

attachment:

cc:
R. Bartoo
R. Gillette
E. Hampton
N. Lacey
R. Skidmore
J. Valencia